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-	13	709/201-203,223-226.ccls. and (select\$3 near5 wireless adj network)	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:22
-	2	(709/201-203,223-226.ccls. and (select\$3 near5 wireless adj network)) and weight\$5	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:21
-	10	709/201-203,223-226.ccls. and weight\$5 same latency same bandwidth	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:25
-	2707	(multiple or plural\$3) adj3 network same wireless	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:26
-	0	((multiple or plural\$3) adj3 network same wireless) and weight\$5 same latency same bandwidth	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:27
-	412	((multiple or plural\$3) adj3 network same wireless) and weight\$5	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:27
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-	114	((multiple or plural\$3) adj3 network same wireless) and weight\$5) and algorithm) and (linear or (non adj linear))	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:28
-	14	((multiple or plural\$3) adj3 network same wireless) and weight\$5) and algorithm) and (linear or (non adj linear))) and exponential	USPAT; US-PGPUB; EPO; JPO	2004/09/23 10:34
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-	0	((US-6131040-\$ or US-6748217-\$ or US-6522884-\$ or US-6484027-\$ or US-6591103-\$ or US-6775267-\$).did. or (US-20020087674-\$ or US-20020015480-\$ or US-20010016034-\$ or US-20020046292-\$ or US-20040151162-\$).did.) and weight\$5	USPAT	2004/09/23 13:12
-	2	weight same speed same bandwidth same latency same network	USPAT; US-PGPUB	2004/09/23 13:17
-	0	weight same speed same bandwidth same latency same wireless	USPAT; US-PGPUB	2004/09/23 13:17
-	12	weight same speed same bandwidth same wireless	USPAT; US-PGPUB	2004/09/23 13:23
-	31	selection same weight same GPS	USPAT; US-PGPUB	2004/09/23 13:24
-	181	GPS same wireless same algorithm	USPAT; US-PGPUB	2004/09/23 13:37
-	2	GPS same wireless same algorithm same linear	USPAT; US-PGPUB	2004/09/23 13:46
-	2	GPS same file same transceiver same weight	USPAT; US-PGPUB	2004/09/23 13:48
-	79	GPS same transceiver same algorithm	USPAT; US-PGPUB	2004/09/23 13:48
-	3	GPS same transceiver same algorithm same priority	USPAT; US-PGPUB	2004/09/23 13:50
-	44	GPS same transceiver same weight	USPAT; US-PGPUB	2004/09/23 13:55
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-	60	GPS and transceiver and (GPS or transceiver) same speed same security	USPAT; US-PGPUB	2004/09/23 13:58

-	0	GPS and transceiver and (GPS or transceiver) same speed same security same latency	USPAT; US-PGPUB	2004/09/23 13:58
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-	12	((US-6583757-\$ or US-6377209-\$ or US-5742907-\$).did. or (US-20020053985-\$ or US-20020033767-\$ or US-20020032853-\$ or US-20030235216-\$ or US-20030153338-\$ or US-20030112883-\$ or US-20030086515-\$ or US-20030073406-\$ or US-20030016770-\$).did.) and (GPS or transceiver) same speed same latency	USPAT; US-PGPUB	2004/09/23 13:59
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-	0	((US-6131040-\$ or US-6748217-\$ or US-6522884-\$ or US-6484027-\$ or US-6591103-\$ or US-6775267-\$).did. or (US-20020087674-\$ or US-20020015480-\$ or US-20010016034-\$ or US-20020046292-\$ or US-20040151162-\$).did.) and bid\$3	USPAT	2004/09/23 14:26
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-	25	GPS and transceiver and (GPS or transceiver) same bid\$5	USPAT; US-PGPUB	2004/09/23 14:31
-	25	((US-5949994-\$ or US-5952966-\$ or US-6542739-\$ or US-6572020-\$ or US-6616049-\$ or US-3555196-\$ or US-6739514-\$ or US-6272341-\$ or US-6477370-\$ or US-6462671-\$ or US-6442549-\$ or US-6308893-\$ or US-6311896-\$ or US-6529731-\$ or US-6075499-\$ or US-6272338-\$ or US-6411806-\$).did. or (US-20030085275-\$ or US-20020130184-\$ or US-20040177032-\$ or US-20010040511-\$ or US-20010051911-\$ or US-20010056396-\$ or US-20040117225-\$ or US-20040056101-\$).did.) and (GPS or transceiver) same bid\$5	USPAT; US-PGPUB	2004/09/23 14:31




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Relevance scale

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- 1** Design and analysis of an algorithm for fair service in error-prone wireless channels
Songwu Lu, Thyagarajan Nandagopal, Vaduvur Bharghavan
July 2000 **Wireless Networks**, Volume 6 Issue 4

Full text available: pdf(317.34 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

- 2 Multiclass priority fair queuing for hybrid wired/wireless quality of service support
Jay R. Moorman, John W. Lockwood
August 1999 **Proceedings of the 2nd ACM international workshop on Wireless mobile multimedia**

Full text available: pdf (1.02 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

- 3 Fair scheduling in wireless packet networks**
Songwu Lu, Vaduvur Bharghavan, R. Srikant
August 1999 **IEEE/ACM Transactions on Networking (TON)**, Volume 7 Issue 4

Full text available: pdf(275.27 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

- 4 A unified architecture for the design and evaluation of wireless fair queueing algorithms
Thyagarajan Nandagopal, Songwu Lu, Vaduvur Bharghavan
March 2002 **Wireless Networks**, Volume 8 Issue 2/3

Full text available: pdf (353.24 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Fair queueing in the wireless domain poses significant challenges due to unique issues in the wireless channel such as location-dependent and bursty channel errors. In this paper, we present a *wireless fair service* model that captures the scheduling requirements of wireless scheduling algorithms, and present a *unified wireless fair queueing architecture* in which scheduling algorithms can be designed to achieve wireless fair service. We map seven recently proposed wireless fair sche ...

Keywords: fair queueing, wireless fair service, wireless networks, wireless scheduling

- 5 A unified architecture for the design and evaluation of wireless fair queueing algorithms
Thyagarajan Nandagopal, Songwu Lu, Vaduvur Bharghavan
August 1999

**Proceedings of the 5th annual ACM/IEEE international conference on
Mobile computing and networking**

Full text available:  [pdf\(1.47 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

6 W2F2Q: packet fair queuing in wireless packet networks

Yung Yi, Yongho Seok, Taekyoung Kwon, Yanghee Choi, Junseok Park

August 2000 **Proceedings of the 3rd ACM international workshop on Wireless mobile multimedia**

Full text available:  [pdf\(946.51 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Recently, there is a growing interest in wireless packet communications due to the explosive growth in wireless communications and the Internet. In this stage, quality of service (QoS) provisioning in wireless/mobile packet networks is becoming more and more important. A key factor in QoS provisioning is packet-scheduling. However, conventional scheduling algorithms in wired network cannot be directly applicable to wireless communication environments because of wireless-specific characteris ...

Keywords: fair queuing, packet scheduling, wireless packet network

7 Fair scheduling in wireless packet networks

Songwu Lu, Vaduvur Bharghavan, Rayadurgam Srikant

October 1997 **ACM SIGCOMM Computer Communication Review , Proceedings of the ACM SIGCOMM '97 conference on Applications, technologies, architectures, and protocols for computer communication**, Volume 27 Issue 4

Full text available:  [pdf\(2.17 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Fair scheduling of delay and rate-sensitive packet flows over a wireless channel is not addressed effectively by most contemporary wireline fair scheduling algorithms because of two unique characteristics of wireless media: (a) bursty channel errors, and (b) location-dependent channel capacity and errors. Besides, in packet cellular networks, the base station typically performs the task of packet scheduling for both downlink and uplink flows in a cell; however a base station has only a limited k ...

8 A wireless fair service algorithm for packet cellular networks

Songwu Lu, Thyagarajan Nandagopal, Vaduvur Bharghavan


October 1998 **Proceedings of the 4th annual ACM/IEEE international conference on Mobile computing and networking**

Full text available:  [pdf\(1.47 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

9 Distributed fair scheduling in a wireless LAN

Nitin H. Vaidya, Paramvir Bahl, Seema Gupta

August 2000 **Proceedings of the 6th annual international conference on Mobile computing and networking**

Full text available:  [pdf\(1.22 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Fairness is an important issue when accessing a shared wireless channel. With fair scheduling, it is possible to allocate bandwidth in proportion to weights of the packet flows sharing the channel. This paper presents a fully distributed algorithm for fair scheduling in a wireless LAN. The algorithm can be implemented without using a centralized coordinator to arbitrate medium access. The proposed protocol is derived from th ...

10 Best poster papers from MobiHoc 2002: Evaluation of packet scheduling algorithms in mobile ad hoc networks

Byung-Gon Chun, Mary Baker

June 2002 **ACM SIGMOBILE Mobile Computing and Communications Review**, Volume 6

Issue 3

Full text available:  pdf(398.37 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We examine the queuing dynamics at nodes in an ad hoc mobile network and evaluate network performance under different packet scheduling algorithms using Dynamic Source Routing (DSR) and Greedy Perimeter Stateless Routing (GPSR) as the underlying routing protocols. Typically, packet schedulers in ad hoc networks give priority to control packets over data packets and serve data packets in FIFO order. We find that setting priorities among data packets can decrease end-to-end packet delay significant ...

11 Energy efficient wireless packet scheduling and fair queuing

Vijay Raghunathan, Saurabh Ganeriwal, Mani Srivastava, Curt Schurgers

February 2004 **ACM Transactions on Embedded Computing Systems (TECS)**, Volume 3 Issue 1

Full text available:  pdf(152.15 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

As embedded systems are being networked, often wirelessly, an increasingly larger share of their total energy budget is due to the communication. This necessitates the development of power management techniques that address communication subsystems, such as radios, as opposed to computation subsystems, such as embedded processors, to which most of the research effort thus far has been devoted. In this paper, we present techniques for energy efficient packet scheduling and fair queuing in wireles ...

Keywords: Energy efficient design, fair scheduling, power management, wireless communication

12 A packet scheduling approach to QoS support in multihop wireless networks

Haiyun Luo, Songwu Lu, Vaduvur Bharghavan, Jerry Cheng, Gary Zhong

June 2004 **Mobile Networks and Applications**, Volume 9 Issue 3

Full text available:  pdf(379.77 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Providing packet-level quality of service (QoS) is critical to support both rate-sensitive and delay-sensitive applications in bandwidth-constrained, shared-channel, multihop wireless networks. Packet scheduling has been a very popular paradigm to ensure minimum throughput and bounded delay access for packet flows. This work describes a packet scheduling approach to QoS provisioning in multihop wireless networks. Besides minimum throughput and delay bounds for each flow, our scheduling disciplin ...

Keywords: ad-hoc networks, fair queueing, wireless MAC, wireless scheduling

13 Coding and Encryption: On error preserving encryption algorithms for wireless video transmission

Ali Saman Saman Tosun, Wu-chi Feng

October 2001 **Proceedings of the ninth ACM international conference on Multimedia**


Full text available:  pdf(157.93 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we describe error preserving encryption mechanisms for transmission of vido over wireless networks. One of the main problems with the secure transmission of data over wireless networks is that the bit errors that occur need to typically be sesolved *before* decryption can begin. For vido straming applications, this is unacceptable due to the general requirement that video be presented to the user in a continuous manner with low latency. In this paper, we describe a systematic ...

Keywords: video encryption, wireless video transmission

14 A new model for packet scheduling in multihop wireless networks

Haiyun Luo, Songwu Lu, Vaduvur Bharghavan

August 2000 **Proceedings of the 6th annual international conference on Mobile computing and networking**Full text available:  pdf(1.24 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

The goal of packet scheduling disciplines is to achieve fair and maximum allocation of channel bandwidth. However, these two criteria can potentially be in conflict in a generic-topology multihop wireless network where a single logical channel is shared among multiple contending flows and spatial reuse of the channel bandwidth is possible. In this paper, we propose a new model for packet scheduling that addresses this conflict. The main results of this paper ...

15 Session 1: Simple heuristics and PTASs for intersection graphs in wireless ad hoc networks

Xiang-Yang Li, Yu Wang

September 2002 **Proceedings of the 6th international workshop on Discrete algorithms and methods for mobile computing and communications**Full text available:  pdf(238.84 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In wireless ad hoc networks, each wireless device has a transmission range, which is usually modeled as a disk centered at this node. A wireless node can send message directly to all nodes lying inside this disk. We present several intersection graphs to model the wireless networks. Then we present some simple heuristics and/or PTASs to approximate the maximum independent set, the minimum vertex cover and the minimum graph coloring in these graph models.

Keywords: PTAS, disk graphs, independent set, vertex coloring, vertex cover, wireless ad hoc networks

16 Routing optimizations: Minimum energy disjoint path routing in wireless ad-hoc networks

Anand Srinivas, Eytan Modiano

September 2003 **Proceedings of the 9th annual international conference on Mobile computing and networking**Full text available:  pdf(452.89 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We develop algorithms for finding minimum energy disjoint paths in an all-wireless network, for both the node and link-disjoint cases. Our major results include a novel polynomial time algorithm that optimally solves the minimum energy 2 link-disjoint paths problem, as well as a polynomial time algorithm for the minimum energy k node-disjoint paths problem. In addition, we present efficient heuristic algorithms for both problems. Our results show that link-disjoint paths consume substantially less ...

Keywords: disjoint paths, distributed algorithms, energy efficiency, minimum energy, multipath routing, wireless ad-hoc networks

17 Minimum-power multicast routing in static ad hoc wireless networks

Peng-Jun Wan, Gruia Călinescu, Chih-Wei Yi

June 2004 **IEEE/ACM Transactions on Networking (TON)**, Volume 12 Issue 3Full text available:  pdf(257.51 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Wieselthier et al. (2000) proposed three greedy heuristics for Min-Power Asymmetric Broadcast Routing: SPT (shortest-path tree), MST (minimum spanning tree), and BIP (broadcasting incremental power). Wan et al. (2001) proved that SPT has an approximation ratio of at least $(n/2)$ where n is the total number of nodes, and both MST and BIP have constant approximation ratios. Based on the approach of pruning, Wieselthier et al. also proposed three greedy heuristics for Min-Power Asymmetric ...

Keywords: approximation algorithms, multicast routing, power control

18 Adapting packet fair queueing algorithms to wireless networks

Parameswaran Ramanathan, Prathima Agrawal

October 1998 **Proceedings of the 4th annual ACM/IEEE international conference on Mobile computing and networking**

Full text available:  pdf(1.02 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



19 Dynamic weighting Monte Carlo for constrained floorplan designs in mixed signal application

Jason Cong, Tianming Kong, Faming Liang, Jun S. Liu, Wing Hung Wong, Dongmin Xu

January 2000 **Proceedings of the 2000 conference on Asia South Pacific design automation**

Full text available:  pdf(238.28 KB) Additional Information: [full citation](#), [references](#)



20 Session 2: E²WFQ: an energy efficient fair scheduling policy for wireless systems

Vijay Raghunathan, Saurabh Ganeriwal, Curt Schurgers, Mani Srivastava

August 2002 **Proceedings of the 2002 international symposium on Low power electronics and design**

Full text available:  pdf(138.18 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)



As embedded systems are being networked, often wirelessly, an increasingly larger share of their total energy budget is due to the communication. This necessitates the development of power management techniques that address communication subsystems, such as radios, as opposed to computation subsystems, such as embedded processors, to which most of the research effort thus far has been devoted. In this paper, we present E²WFQ, an energy efficient version of the Weighted Fair Que ...





Keywords: energy efficient design, fair scheduling, power management, wireless communications

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1 A flow control scheme for wireless ATM with hybrid ARQ and weighted ERICA algorithm combined

Lingqing Wang; Lingsheng Wang; Shilou Jia;

Personal, Indoor and Mobile Radio Communications, 2003. PIMRC 2003. 14th IEEE Proceedings on , Volume: 3 , 7-10 Sept. 2003
Pages:2538 - 2542 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(367 KB\)\]](#) IEEE CNF

2 Dynamic packet scheduling for wireless channel with varying capacity

Zhang, L.; Lee, T.T.;

Vehicular Technology Conference, 2003. VTC 2003-Spring. The 57th IEEE Semiannual , Volume: 2 , 22-25 April 2003
Pages:1459 - 1463 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(328 KB\)\]](#) IEEE CNF

3 A weighted on-demand routing algorithm in multichannel multihop wireless network

Yongchun Tian; Wei Guo;

Communications, Circuits and Systems and West Sino Expositions, IEEE 2002 International Conference on , Volume: 1 , 29 June-1 July 2002
Pages:424 - 427 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(318 KB\)\]](#) IEEE CNF

4 Signal acquisition and tracking with adaptive arrays in wireless systems

Winters, J.H.;

Vehicular Technology Conference, 1993 IEEE 43rd , 18-20 May 1993
Pages:85 - 88

[\[Abstract\]](#) [\[PDF Full-Text \(360 KB\)\]](#) IEEE CNF

5 A unified approach to scheduling, access control and routing for ad-hoc wireless networks

Ayyagari, D.; Michail, A.; Ephremides, A.;

Vehicular Technology Conference Proceedings, 2000. VTC 2000-Spring Tokyo. 2000 IEEE 51st , Volume: 1 , 15-18 May 2000

Pages:380 - 384 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(432 KB\)\]](#) IEEE CNF

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